



Pre-Pregnancy Underweight and Related Prematurity in Newborns

KEY FINDINGS

1. Nearly 4% of all Oklahoma mothers were underweight (BMI < 18.5) prior to pregnancy.

2. Underweight mothers were more likely to be:

Younger

Non-Hispanic Asian

3. Underweight mothers had higher prevalence of:

Previous preterm births

Shorter birth spacing

4. Mothers who were underweight were 30% more likely to have a preterm birth.

5. The risk for preterm births was higher at 40% for underweight mothers who did not gain the recommended weight in pregnancy.

Introduction

Pregnancies in underweight women have been associated with adverse birth outcomes such as preterm birth, low birth weight, and increased perinatal mortality. For mothers who are underweight there is an increased risk for nausea, vomiting and dehydration during pregnancy¹. A body mass index of less than 18.5 is considered underweight. The American College of Obstetricians and Gynecologists recommends that someone with a BMI of 18.5 and below before or at the beginning of pregnancy gain anywhere from 28-40 pounds in pregnancy².

Compared to obesity, maternal underweight has not been the subject of diverse research since it affects a smaller percentage of women. In the US around 3.0% of all women are underweight before they enter pregnancy³. In 2017, 3.5% of Oklahoma women were underweight prior to pregnancy. However, since 2010 there has been a steady decline in underweight women having babies (20%). About 1 in 5 infant deaths in Oklahoma are due to causes related to prematurity. With research indicating an association between underweight mothers and preterm births, this report explores the characteristics and outcomes associated with underweight mothers.

Report Objective

The specific objective of this report is to assess the prevalence of pre-pregnancy underweight among Oklahoma mothers and study its impact on prematurity.

Methods and Findings

The data for this report were abstracted from the Oklahoma Birth Certificate data for years 2013-2017. Body Mass Index (BMI) was calculated using the height and weight of mothers available in the birth dataset. BMI was classified as underweight (< 18.5), normal (18.5 – 24.9), overweight (25.0 – 29.9), and obese (≥ 30.0). Overall 3.9% of all births in Oklahoma were to mothers who were underweight, 41.7% of the mothers were of normal BMI, 25.6% were overweight, and 28.9% were obese. This report specifically focuses on mothers who were underweight prior to pregnancy (n = 9,946).

The prevalence of mother's underweight was examined by age, race, marital status, education, area of residence, the presence of chronic conditions, birth spacing, and delivery risks. Among underweight mothers, the risk for preterm births overall and by weight gained during pregnancy were estimated. Differences in the prevalence estimates were tested using a Chi-square test. The association of pre-pregnancy underweight to preterm births was assessed using both unadjusted and adjusted odds ratios (OR) from a logistic regression model. The data were analyzed using SAS version 9.4.

Maternal Demographics

Age

Younger mothers were more prone to be underweight than older mothers. Nearly 8.0% of mothers under 18 years were underweight compared to 1.9% among mothers over 40 years.

Race and Hispanic Origin

Non-Hispanic Asian mothers were underweight at a higher rate than mothers of other races (8%). Non-Hispanic White mothers and mothers reporting “other and multiple races” each were over 4% underweight prior to pregnancy.

Education

Mothers over 17 years and with less than high school education were underweight at a higher rate than mothers with high school or more than high school education (5.4%, 4.5%, 3.1%).

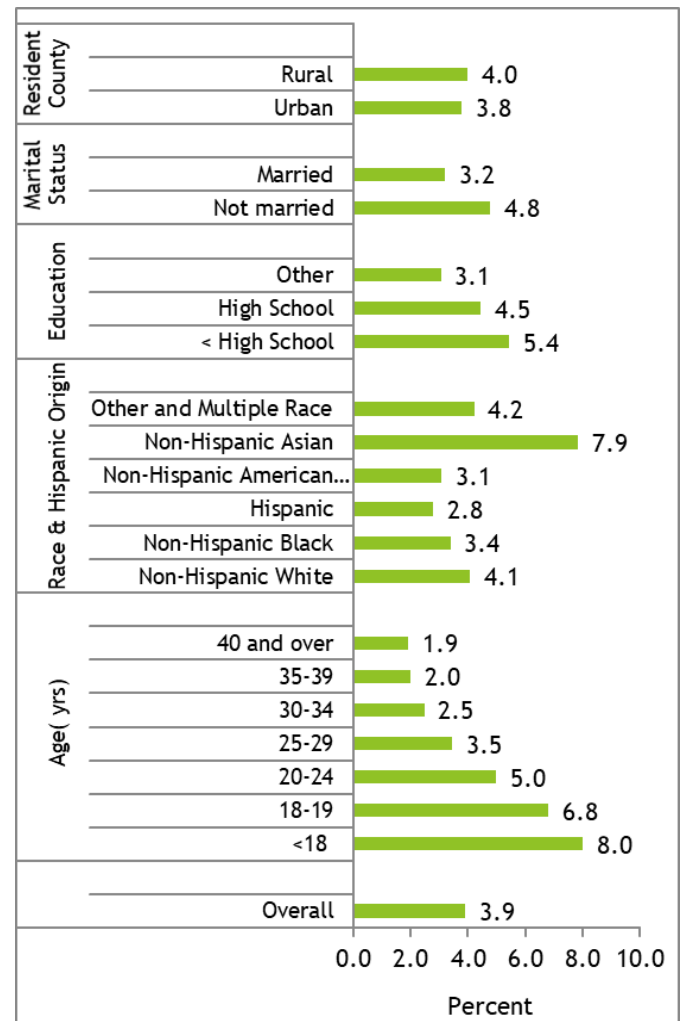
Marital status

Mothers who were not married had a higher rate of being underweight than mothers who were married (4.8%, 3.2%).

Area of residence

Underweight mothers were distributed more or less equally among urban and rural areas of Oklahoma (4.0%, 3.8%).

Figure 1. Characteristics of Underweight Mothers



Pregnancy Related Health Conditions and Experiences

Birth spacing

Over 55% of underweight mothers had at least one previous live birth. Of these mothers, 12.9% had a previous live birth within 18 months and 26.7% had one within 24 months. However, this experience was not significantly different from mothers who had normal or higher BMI (Figure 3).

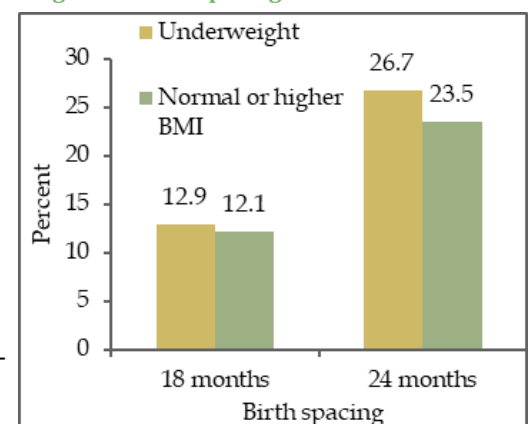
Prior pregnancy poor outcomes

Approximately 6% of the underweight mothers reported a previous preterm birth while around 4% of mothers with higher BMI reported a previous preterm birth ($p < 0.05$). However the prevalence of other previous poor outcomes reported were nearly the same for the two groups of mothers.

Chronic conditions

Underweight mothers reported lower prevalence of pre-pregnancy chronic conditions such as diabetes and hypertension than mothers with higher BMI. Gestational diabetes and hypertension were also significantly lower among underweight mothers (Figure 4).

Figure 3. Birth Spacing



Prenatal care

Underweight mothers accessed prenatal care in the first trimester at a lower rate than other mothers (65.2% vs. 69.4%). There was also a higher percent of underweight mothers who did not ever access prenatal care (2.5% vs. 1.7%) (data not shown).

Figure 4. Chronic Conditions in Underweight Mothers

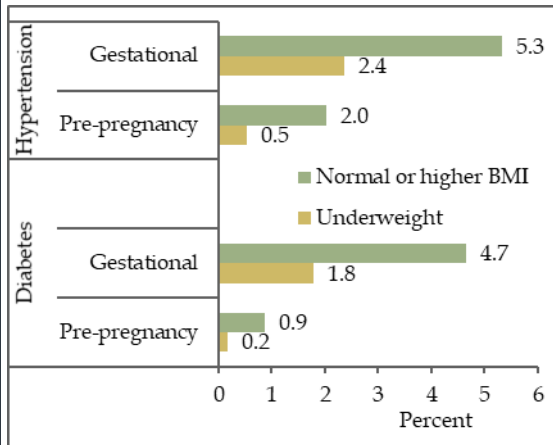
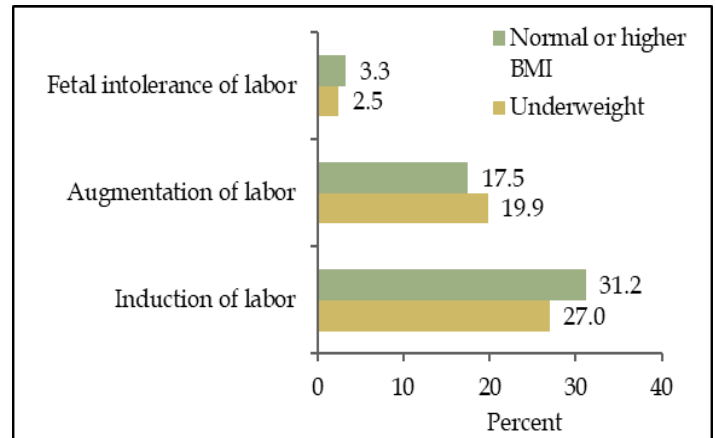


Figure 5. Underweight Mothers and Delivery Risks



Pregnancy weight gain

For underweight women, ACOG recommends pregnancy weight gain in the range of 28 – 40 lbs. Nearly 33% of the underweight mothers gained lower than the ACOG recommended weight, while 41% gained the recommended weight and 26% gained more than the recommended weight (data not shown).

Delivery risk factors

Compared to mothers with higher BMI, underweight mothers reported a higher rate for augmentation of labor; however they reported lower rates for fetal intolerance and induction of labor (Figure 5). Underweight mothers also had a significantly lower Cesarean section rate compared to the other mothers (21.5% , 33.1%) (data not shown).

Preterm Births

Underweight mothers had higher rates of preterm and late term births (< 37 weeks, 37–38 weeks of gestation) than mothers with normal and higher BMI (Figure 6). The largest difference in the percent of preterm births between underweight mothers and mothers with higher BMI was for 35-36 weeks of gestation (7.6% vs. 6.3%).

Figure 6. Gestational Age among Underweight Mothers

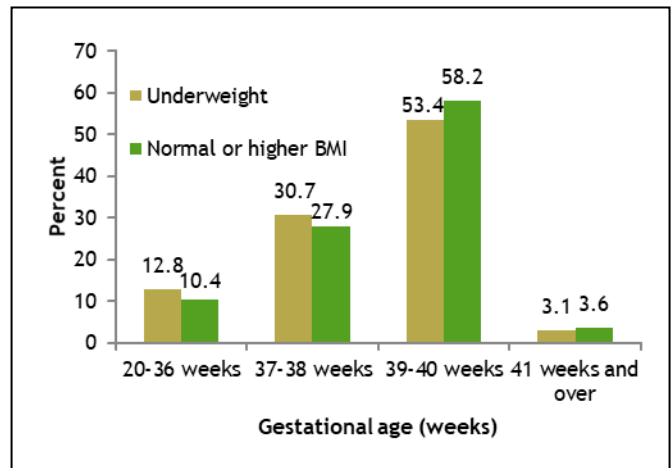


Table 1. Unadjusted and Adjusted Association between Mothers Underweight Status and Preterm Birth

Pre-Pregnancy Body Mass Index	Unadjusted OR (95% C.I.)	Adjusted OR (95% C.I.)
Underweight	1.3 (1.2 - 1.4)	1.3 (1.2 - 1.4)
Underweight and not gained recommend weight	1.8 (1.6 - 2.1)	1.4 (1.4 - 1.5)

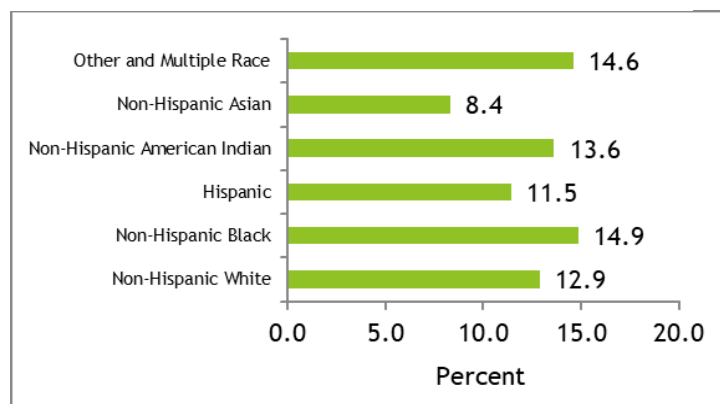
Underweight Asian mothers had the lowest rate of preterm births compared to other races (Figure 7). This is noteworthy considering that non-Hispanic Asians had double the rate of underweight mothers compared to non-Hispanic whites. Non-Hispanic African American mothers and mothers of multiple races each had preterm births at the rate of 15%.

Underweight mothers who gained less than the ACOG recommended weight in pregnancy had a much higher rate of preterm births compared to mothers who gained the recommended weight (18.5% ,10.9%).

Overall, adjusting for age, race, education, and the prevalence of previous preterm births, an underweight mother had 30% higher chance of having a preterm birth (adjusted OR 1.3 (1.2 – 1.4)) compared to mothers with higher BMI (Table 1).

The risk was even higher at 40% for underweight mothers who did not gain the ACOG recommended weight of 28-40 pounds in pregnancy (adjusted OR 1.4 (1.4—1.5)).

Figure 7. Preterm Birth Rates of Underweight Mothers by Race



Conclusions

Prematurity continues to be a complex issue facing Oklahomans. Healthcare interventions have been largely ineffective at significantly reducing the preterm birth rate. Young African American women, with less than a high school education have a higher risk of many health related issues including preterm births. Adding the burden of being underweight appears to further increase this risk. However, studies have shown a lower risk for preterm births among Asian women in spite of a higher prevalence of pre-pregnancy underweight⁴.

Underweight women with a previous preterm birth experience a higher risk of a subsequent preterm birth which is concerning given the data indicate underweight women are more likely to not seek prenatal care or to seek prenatal care later than mothers with higher BMI.

Underweight women need preconception counseling to inform them of their risks and increased monitoring during the prenatal period for access to nutritional foods.

Additionally, this report highlights the need for women to be as healthy as possible before pregnancy. This can be accomplished through health education in schools and regular checkups with a health care provider.

Acknowledgments

Special assistance for this report was provided by: Binitha Kunnel, MS; and Jill Nobles-Botkin, MSN, APRN-CNM

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